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INTERNATIONAL PRELIMINARY EXAMINATION REPORT  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference OLI-P1 PCT		<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/IB 03/03939		International filing date (day/month/year) 04.09.2003	Priority date (day/month/year) 12.09.2002
International Patent Classification (IPC) or both national classification and IPC G02B21/06			
Applicant OLIMATECH LTD. et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 6 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input checked="" type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>			
Date of submission of the demand 06.04.2004		Date of completion of this report 14.12.2004	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Hoogen, R Telephone No. +49 89 2399-2192 	

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/IB 03/03939

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*):

**Description, Pages**

1-4, 6-15 as originally filed  
5, 5a filed with telefax on 14.09.2004

**Claims, Numbers**

1-22 filed with telefax on 14.09.2004

**Drawings, Sheets**

1/13-13/13 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).  
☐ the language of publication of the international application (under Rule 48.3(b)).  
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority in written form.  
☐ furnished subsequently to this Authority in computer readable form.  
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.  
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).  
*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:
- ☐ the entire international application,
  - ☐ claims Nos.  
because:
  - ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):
  - ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
  - ☒ the claims, or said claims Nos. 11,17,18 are so inadequately supported by the description that no meaningful opinion could be formed.
  - ☐ no international search report has been established for the said claims Nos.
2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:
- ☐ the written form has not been furnished or does not comply with the Standard.
  - ☐ the computer readable form has not been furnished or does not comply with the Standard.

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims	4,5,7-10,12,14-16,19-22
	No: Claims	1-3,6,13
Inventive step (IS)	Yes: Claims	4,5,7-10,21
	No: Claims	1-3,12-16,19,20,22
Industrial applicability (IA)	Yes: Claims	1-10,12-16,19-22
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

**Re Item III**

**Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

The amendments filed with the telefax dated 14.09.2004 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT. The amendments concerned are the following:

1. In claim 11 as originally filed the various layers and elements of the claimed structure are specified to be *"curved to enable contacting the medium at one particular location"*. This passage was changed to *"structured, in particular curved, to enable generating the localized source in one or several locations of the plasmon-transmitting interface to the medium"*.

The meaning of the term "structured" is much more general than "curved". Also original claim 11 specifies a single point of contact between the structure and a medium whereas present claim 11 specifies one or more locations of a localized source.

2. In claim 17 it is specified that surface plasmons are only excited at the side of the surface plasmon-supporting element attached to the plasmon transmission means, whereas in claim 18 it is specified that surface plasmons are excited on both sides of the surface plasmon-supporting element.

In the description as originally filed it is merely stated that a surface plasmon is generated at the bottom surface of the surface plasmon-supporting element (cf. p. 10, l. 1-5). From this disclosure the additional features of claims 17 and 18 cannot be directly and unambiguously be derived.

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Reference is made to the following documents:

D1: US 2002/056816 A1

D2: J. OPT. SOC. AM. A, vol. 18, no. 4, April 2001, pages 854-861

**2. Independent apparatus claim 1**

Document D2 (cf. section 3.B; fig. 8) discloses a structure suitable for producing a localized light source in a medium, comprising

- a source for generating incident light (implicit from subtitle of fig. 8);
- a glass substrate;
- a surface-plasmon-supporting silver layer deposited on said substrate;
- a glass protrusion deposited on said silver layer for transmitting and localizing plasmons between said silver layer and a medium, said glass protrusion providing a discontinuity between said silver layer and said medium for generating a localized electromagnetic field deviation and a plasmon-transmitting interface with predetermined electromagnetic properties at said medium,

wherein said incident light excites a surface plasmon in said silver layer, which in turn produces said localized light source at said plasmon-transmitting interface by localizing the energy of said surface plasmon.

D2 therefore anticipates the subject-matter of claim 1 (Art. 33 (2) PCT).

**3. Independent method claim 16**

D2 also discloses a method comprising all steps of independent claim 16 except that the localized light source is generated in a (not further specified) medium rather than in a vacuum (see passages already cited with respect to claim 1). However, placing the structure displayed in fig. 8 of D2 in a medium, e.g. air, would be straightforward for the skilled person (if only for checking out the effect of localized surface plasmons in different media).

The method according to claim 16 is therefore not inventive (Art. 33 (3) PCT).

**4. Dependent claims**

D2 also anticipates the additional technical features of claims 2, 3, 6, and 13 (see passages already cited with respect to claim 1).

The additional features of claims 12, 14, 15, 19, 20, and 22 are obvious in view of D2 in combination with D1 (cf. para. [0066], [0069], [0073], [0124]).

The additional technical features of dependent claims 4, 5, 7-10, and 21 do not

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appear to be anticipated or fairly suggested by the documents cited in the  
International Search Report.

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US CLAIMS

1. A structure for producing a localized light source in a medium,  
*comprising*
  - 5     • a source generating incident light,
  - a surface-plasmon-supporting layer,
  - means for transmitting and localizing plasmons between said surface-plasmon-supporting layer and said medium,
  - said transmitter-localizer means including between said surface-plasmon-supporting layer and said medium
    - 10       • a discontinuity for providing a localized electromagnetic field deviation and
    - a plasmon-transmitting interface with predetermined electromagnetic properties at said medium
  - 15     • wherein said incident light excites a surface plasmon in said surface-plasmon-supporting layer, which plasmon in turn produces said localized light source at said plasmon-transmitting interface by localizing the energy of said surface plasmon.
- 20   2. The structure of claim 1, *wherein*  
      the discontinuity for providing a localized electromagnetic field deviation is a physical discontinuity localizing the electromagnetic field associated with a plasmon generated by said surface-plasmon-supporting layer.
- 25   3. The structure of claim 2, *wherein*  
      the discontinuity consists of or includes one or more protrusions contacting the medium.

4. The structure of claim 2, *wherein*  
the discontinuity consists of or includes one or more inclusions.
5. The structure of claim 1, *further including*  
5 means, in particular a grating, for enhancing the generation of  
surface plasmons by the surface-plasmon-supporting layer.
6. The structure of claim 1, *further including*  
a substrate carrying the surface-plasmon-supporting layer and the  
10 transmitter-localizer, and providing a transfer of the incident light.
7. The structure of claim 1, *wherein*  
the surface-plasmon-supporting layer is made of two or more  
different materials.
- 15 8. The structure of claim 1, *wherein*  
a plurality of sources for generating incident light is provided for  
simultaneous or sequential use.
- 20 9. The structure of claim 1, *wherein*  
the surface-plasmon-supporting layer consists or comprises a plurality of  
patches or strips which are individually addressable.
10. The structure of claim 1, *further including*  
25 one or more additional surface-plasmon-supporting layers for enhancing  
the localized light source.



- 5
11. The structure of any of claim 1, *wherein*  
the various layers and elements of said structure are structured, in  
particular curved, to enable generating the localized light source in one  
or several locations of the plasmon-transmitting interface to the medium.
- 10
12. The structure of claim 1, *wherein*  
the width and/or length of the means for localizing the generated  
plasmon, in particular of a protrusion, is a fraction of the wavelength of  
the localized light source, preferably less than about one tenth of said  
wavelength.
- 15
13. The structure of claim 1, *wherein*  
for visible light operation, the surface plasmon-supporting layer consists  
of or includes any of gold, silver and/or copper.
- 20
14. The structure of claim 1, *wherein*  
for operation in the UV region, the surface plasmon-supporting layer  
consists of or includes a metal, preferably aluminum.
- 25
15. The structure of claim 1, *wherein*  
for operation in the infrared region, the surface plasmon-supporting  
layer consists of or includes a metal and/or a metal-oxyde mixture,  
preferably indium tin oxide.
16. A method for generating a localized light source in a medium, *comprising*  
*the following steps:*
- generating incident light,
  - exciting a surface plasmon from said incident light in a surface-  
plasmon-supporting element,

- transmitting said surface plasmon by plasmon transmission means to a localized interface with predetermined electromagnetic properties between said plasmon transmission means and said medium, so that said localized light source is generated at said interface.

5

17. The method for generating a localized light source according to claim 16,  
*wherein*

surface plasmons are excited only on the side of the surface  
plasmon-supporting element attached to the plasmon transmission  
means.

10

18. The method for generating a localized light source according to claim 16,  
*wherein*

surface plasmons are excited on both sides of the surface  
plasmon-supporting element.

15

19. Use of a structure according to claim 1 in or for optical lithography and/or  
optical data storage and/or high resolution optical microscopy and/or  
biochips

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20. Use of a method according to claim 16 in or for optical lithography and/or  
optical data storage and/or high resolution optical microscopy and/or  
biochips.